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Horseshoe

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ABSTRACT OF THE DISCLOSURE

A horseshoe has a core (12) and at least one layer (17, 18) coating the core (12). The core (12) has cavities (13; 125) into which said layer (17, 18) is impregnated, decreasing the weight of the horseshoe.

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

STANDARD PATENT

Applicant(s):

TAIWA CO., LTD.

Invention Title:

HORSESHOE

The following statement is a full description of this invention, including the best method of performing it known to me/us:

HORSESHOE

The present invention relates to a horseshoe.

Conventional horseshoe has a shoe body with a hoof shape formed by forging with steel. Recently, various horseshoes designed to reduce their weights have been proposed as replacements of the steel horseshoes. Figure 9 is perspective view of the horseshoe seen from the bottom side. The horseshoe has a shoe body 31 including a core 32 of aluminum. The core 32 has a shape matching with a hoof, and a coating layer 33 of a synthetic resin enclosing the entire outer surface of the core 32.

The aluminum core 32 contributes to reducing the weight of the shoe. However, the aluminum decreases the strength of the shoe in comparison with the steel that makes the shoe weighty. The heavy shoe encumbers a horse as it runs. Besides, the steel results in a higher material cost.

According to the present invention there is provided a horseshoe having a core and at least one layer coating the core, said horseshoe being characterized in that said core has a shape of a closed loop, wherein said core has chains of cavities extending in an entire peripheral direction in respect with the core and wherein said layer is impregnated into the cavities.

The present invention will be more particularly described with reference to the accompanying drawings, in which:

Figure 1 is cross-sectional view illustrating a horseshoe according to the present invention;

Figure 2 is a perspective view illustrating a core forming a shoe body;

Figure 3 is a perspective view illustrating the horseshoe;

Figure 4 is a fragmentary perspective view illustrating a top surface of the horseshoe;

Figure 5 is a fragmentary bottom plain view illustrating the horseshoe;

Figure 6 is an enlarged cross-sectional view illustrating the essential portions of the horseshoe;

Figure 7 is a cross-sectional view depicting a modification of the horseshoe; and

Figure 8 is a cross-sectional view illustrating another modification; and

Figure 9 is a perspective view illustrating a conventional horseshoe.

A horseshoe according to a preferred embodiment of the present invention will now be described with reference to Figures 1 through 6.

A shoe body 11 has a core 12 forged with steel into a ring shape corresponding to a hoof shape. The core 12 has its top surface 121 and its bottom surface 122. Recesses 13 are marked off and formed on the top surface 121. The formation of the recess 13 provides thick portions 14 and thin portions 15.

Iron lips 16 are securely provided by forging, standing upright, on the periphery of the core 12 at two locations to restrict the forward movement of a hoof 22 on the top of the shoe body 11. As shown in Figure 1, the top surface 121, bottom surface 122, and outer and inner peripheral surfaces 123, 124 of the core are mold-coated with a first coating layer 17 of a transparent resin. A top surface 171 of this first coating layer 17 contacts the hoof 22. Projections 172 are formed on the top surface 171 of the layer 17 as shown in Figures 1, 3. Each of the projections

functions to prevent the hoof 22 from sliding on the layer 17. The material for the layer 17 may be an urethane-based resin (polyurethane).

The bottom surface 122, and the outer peripheral surface 123 and the inner peripheral surface 124 are mold-coated with the first coating layer 17. They are mold-coated with a second coating layer 18 comprised of a transparent resin material. A bottom surface 181 of this second coating layer 18 contacts the surface of road. The resin for the second coating layer 18 is a reinforced, wear resisting material, such as copolymer (Teflon FEP) of carbon, tetrafluoroethylene and hexafluoropropylene resins, or a tetrafluoethylene resin mixed in the aforementioned urethane-based resin.

As illustrated in Figure 4, grooves 24 are formed in the bottom surface 181 of the layer 18 at a plurality of locations. The grooves 24 extend in parallel to each other. Each of the grooves 24 opens to the outer periphery of the shoe body 11. As shown in Figure 5, a plurality of (four to six in this embodiment) recesses 25 are formed linearly at predetermined pitches in a bottom 241 of the groove 24. The recesses 25 function as a group of indexes to indicate a point where the square nails 23 are to be driven.

As shown in figure 4, the from three and the rear two

of the grooves 24 each has guide notches 26 arranged at a plurality of locations along opposing walls 242. Each of the guide notches 26 specifies the position and the angle at which the associated square nail 23 is to be driven so as to guide the square nail 23 that is driven in the horseshoe. Each of the notches 26 has a guide surface 261 for guiding a side 231 of the associated square nail 23. The square nail 23 is, thus, kept parallel to the outer surface of the shoe body 11 as illustrated in Figure 5.

Mold formation of the coating layers 17, 18 is carried out as follows.

After the core 12 has been laid in the cavity of one of the molds, a resin solution is injected into the cavity to entirely enclose the core 12 to form the first coating layer 17. The resin solution is also injected into each recess 13, thereby mold-forming the first coating layer 17. Subsequently, a resin solution is injected into the cavity to enclose the surface of the first coating layer 17 other than the top surface thereof, while the core 12 enclosed with the first coating layer 17 is retained in the cavity of another mold. The second coating layer 18 is thus formed. At the time the first coating layer 17 is formed, a coating layer 21 which covers the outer surfaces of the iron lips 16 is formed.

In consideration of the relative sizes of the shoe body 11 and the hoof 22, it is determined which recess in the groove 24 the square nail 23 should be driven to attach the shoe body 11 to the hoof 22.

Nail driving holes are previously bored through the first and second coating layers 17, 18 with a drill at the positions of the specific indication recesses 25 where the associated nails are to be driven.

Subsequently, a horse's leg is bent to keep the hoof 22 obliquely upward, so that the top surface 171 of the first coating layer 17 of the shoe body 11 abuts against the bottom surface of the hoof 22. Next, the square nail 23 is driven into the hoof 22 through the hole formed in association with the corresponding recess 25 of the groove 24. Then, the distal end of the square nail 23 which protrudes from the hoof 22 is bent along the surface of the hoof 22. The above work is carried out for every nail position to complete attachment of the horseshoe to the hoof 22.

As the shoe body 11 has the multiple recesses 13 formed in the top surface 121 of the steel forged core 12, it can have a lighter weight and an improved durability while keeping the rigidity, as compared with the one having the core 12 integrally formed of a steel-based material.

The resin filled in the multiple recesses 13 secures the contact are between the hoof 22 and the shoe body 11 to prevent the hoof 22 from being damaged, even though the multiple recesses 13 exist.

The transparent coating layer 17 enables the manufacturers to check the molded parts inside the horseshoe. This allows the easy discovery of the unsatisfactorily molded goods.

It should be apparent to those skilled in the art that this invention may be embodied in the following forms.

As shown in Figure 7, the recesses 13 of the core 12 may be replaced with through holes 125. In this case, as the first and second coating layers 17, 18 are coupled to one another in the through holes 125, separation of the coating layers 17, 18 from the core 12 can be prevented.

As shown in Figure 8, the second coating layer 18 may be omitted.

The core 12 may be formed of a metal, such as an aluminum alloy or brass alloy.

The horseshoe without the first and second coating layers 17, 18 may be provided. This horseshoe may have the

top surface formed of a material which has a softness suitable for the hoof 22, e.g., an aluminum alloy, while the bottom surface may be formed of a steel-forged material.

Both coating layers 17, 18 may be formed of a synthetic rubber base material, ceramic base material, cork or the like in place of the resin base material.

Metal pins though not shown may be securely fitted in a plurality of through holes (three holes shown in Figure 3) located at the front of the core 12 illustrated in Figure 2 in such manner that the pins protrudes inside the second coating layer 18.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprising" is used in the sense of "including", i.e. the features specified may be associated with further features in various embodiments of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A horseshoe having a core and at least one layer coating the core, said horseshoe being characterized in that said core has a shape of a closed loop, wherein said core has chains of cavities extending in an entire peripheral direction in respect with the core and wherein said layer is impregnated into the cavities.

2. The horseshoe as set forth in Claim 1, characterized in that said cavities are recesses.

3. The horseshoe as set forth in Claim 2, wherein said recesses are respectively open upward.

4. The horseshoe as set forth in Claim 1, wherein said cavity means includes vertical throughholes.

5. The horseshoe as set forth in any one of Claims 1 to 4, wherein said core is formed of an iron-based material.

6. A horseshoe substantially as herein described with reference to and as illustrated in Figures 1 to 8 of the accompanying drawings.

Dated this 31st day of December 1999.

TAIWA CO., LTD
By Its Patent Attorneys
GRIFFITH HACK
Fellows Institute of Patent and
Trade Mark Attorneys of Australia

Fig.1

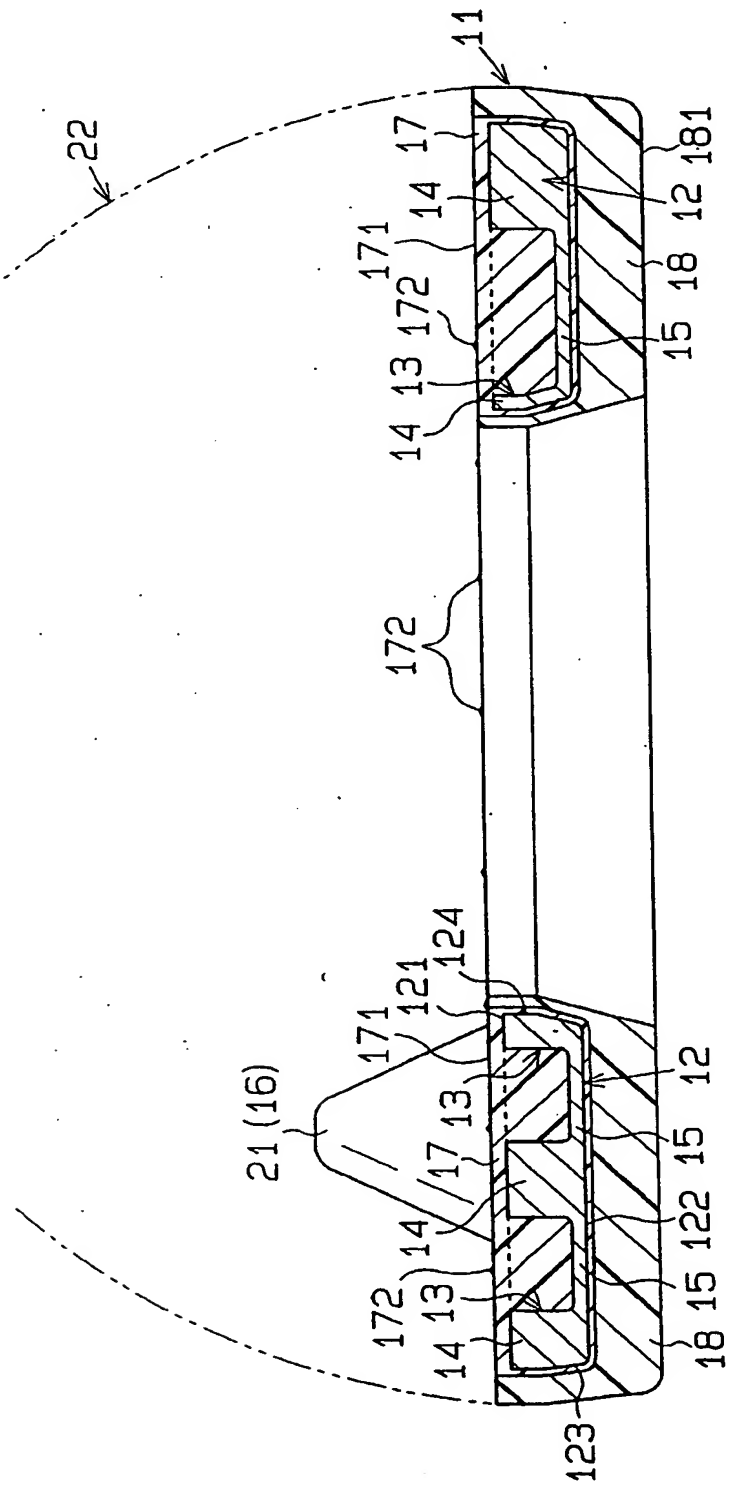
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Fig.2

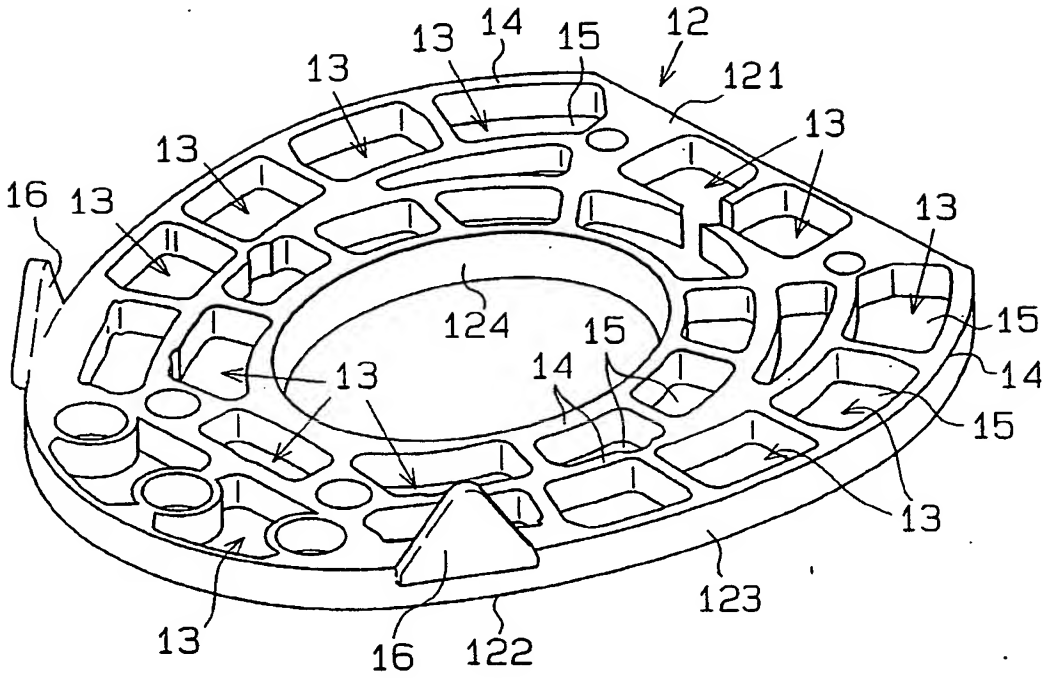

Fig.3

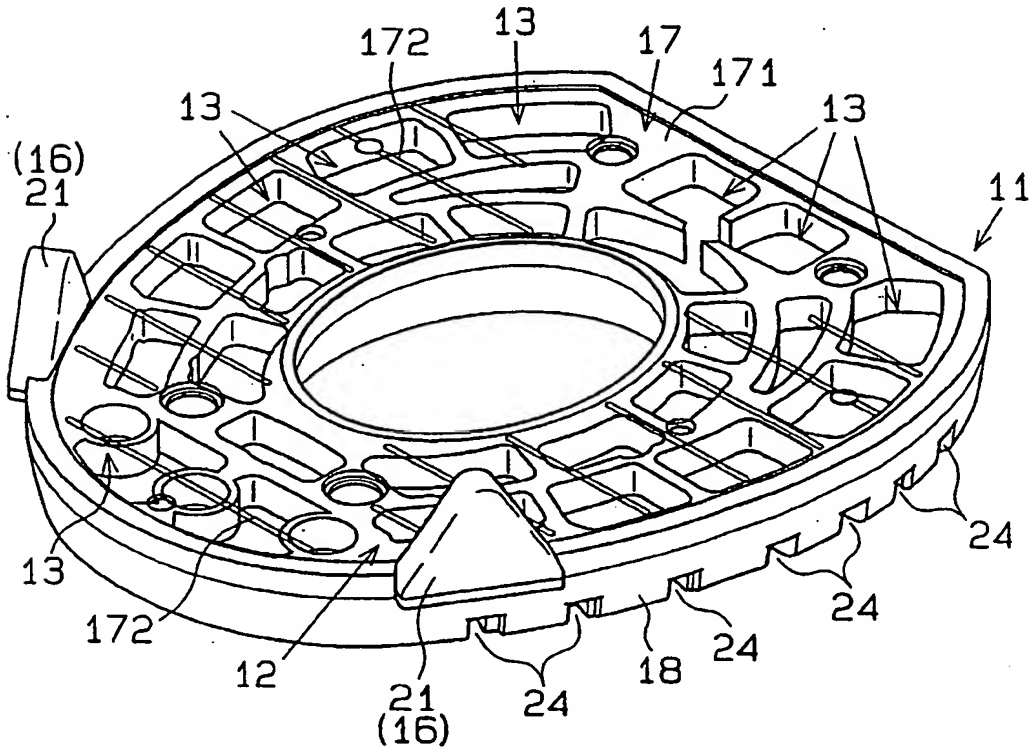

Fig.4

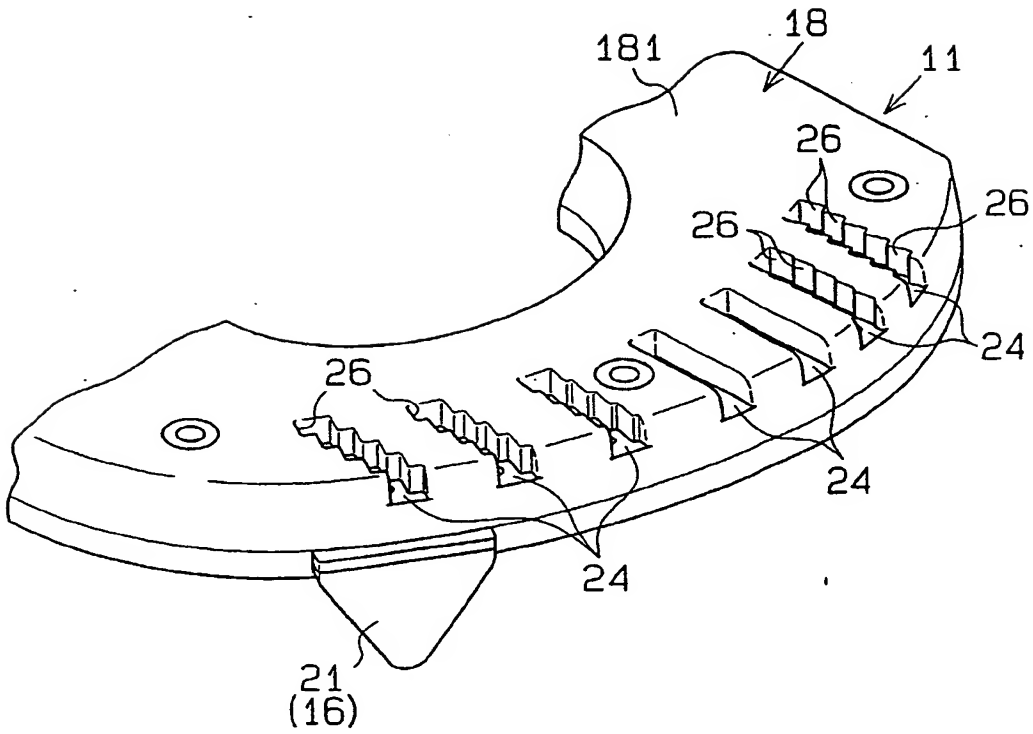

Fig.5

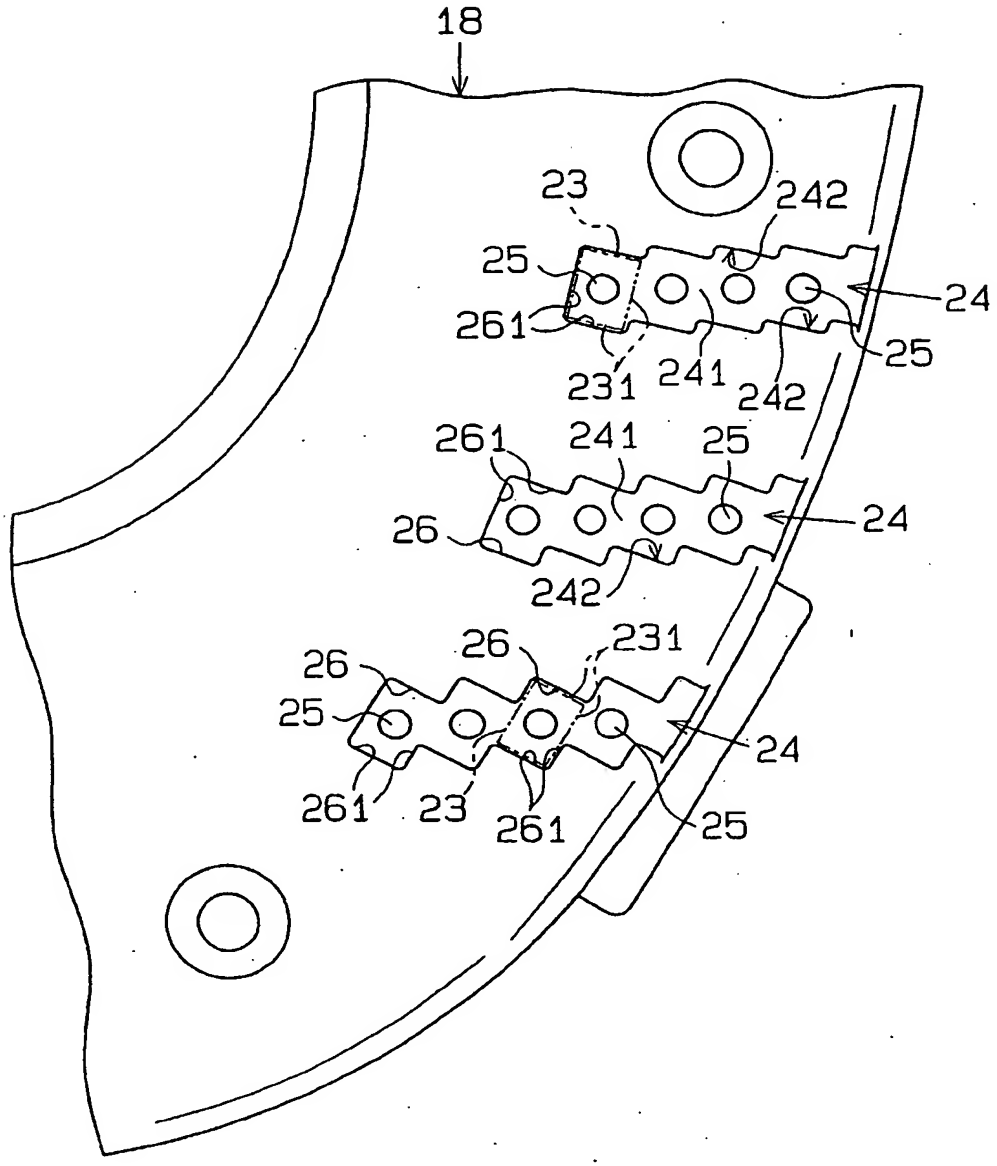
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Fig.6

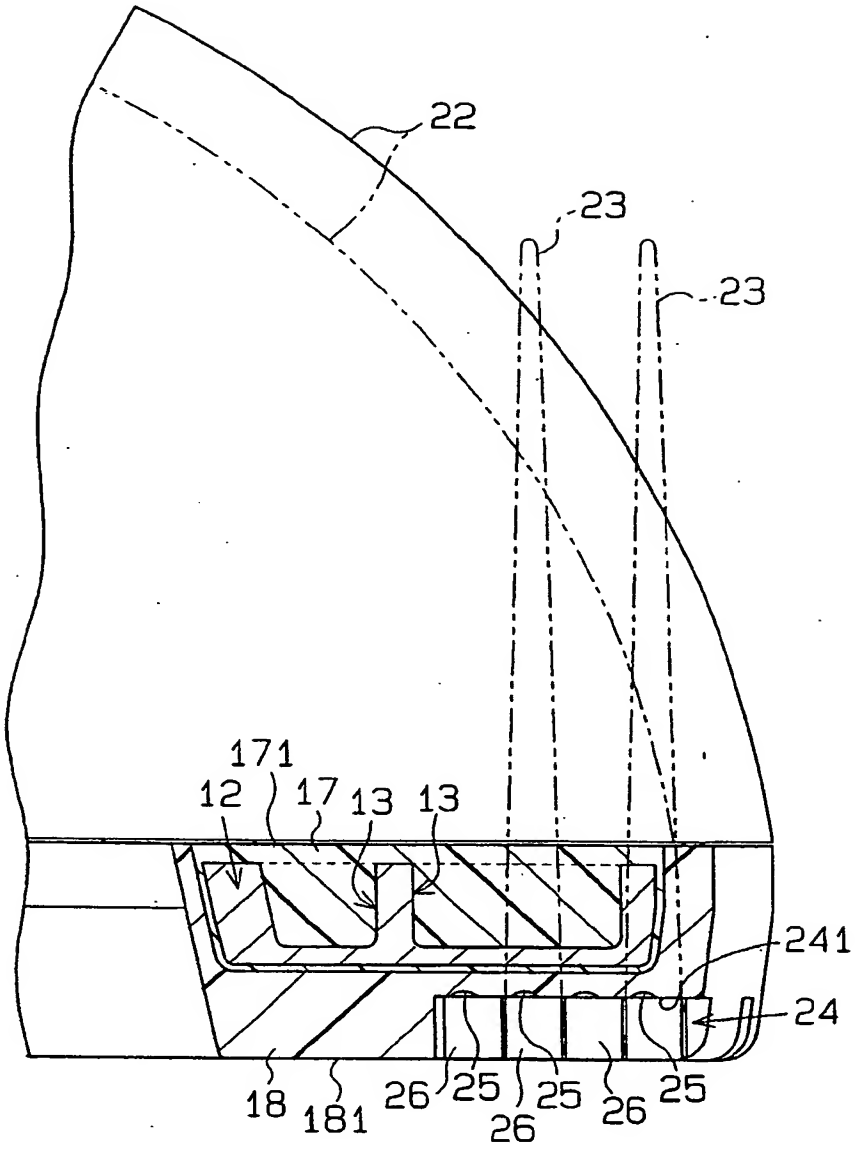

Fig.7

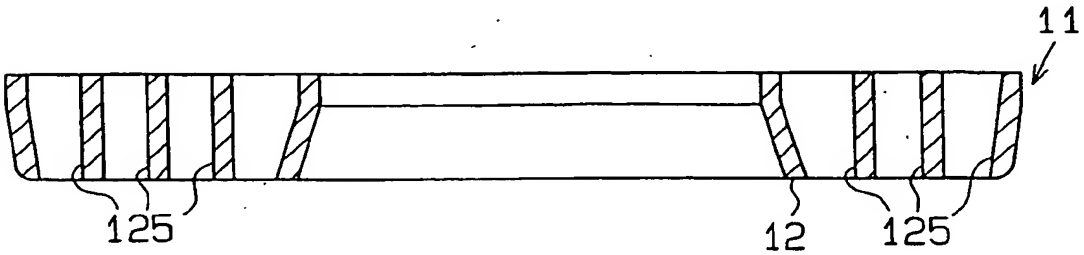

Fig.8

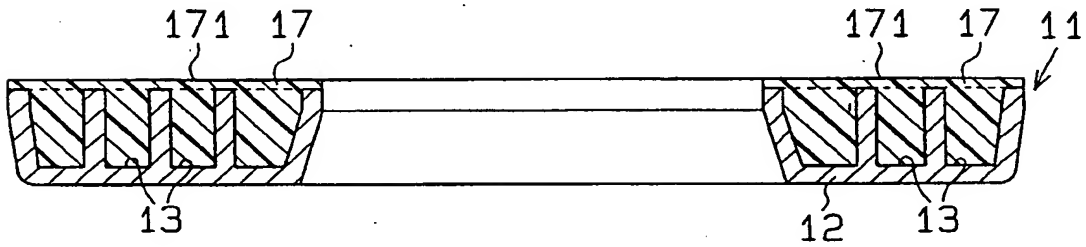

Fig.9